



Ground Water Rule

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Drinking Water Program

February, 2009
SDWWA Water Seminar
Rapid City



February 19,
2009

Groundwater Rule



Reduce public health
risk associated with
fecal contamination
for people served by
groundwater sources



February 19,
2009

Signed by EPA-
October 11, 2006

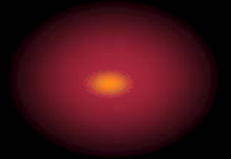
Compliance Date-
December 1, 2009



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Major Provisions

- Sanitary surveys
- Source water monitoring
- Corrective actions
- Compliance monitoring



Sanitary Surveys

- Every 3 years for CWS/5 years for NCWS
- Eight key elements
- State must have authority to enforce corrections of "significant deficiencies"



Elements of Surveys



- Source (Protection, Physical Components and Condition)
- Treatment
- Distribution System
- Finished Water Storage
- Pumps Facilities and Controls
- Monitoring/Reporting/Data Verification
- Water System Management/Operations
- Operator Compliance with State Requirements

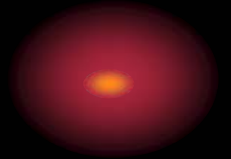
Source Water Monitoring

- Systems w/ wells in sensitive aquifer (Assessment monitoring)
- Contamination in distribution systems (Triggered monitoring)



Fecal Indicator

Will most likely be *E. coli* as labs are already set up and certified for it—
Methods, Equipment, etc.



Assessment Monitoring

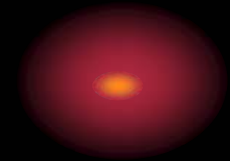
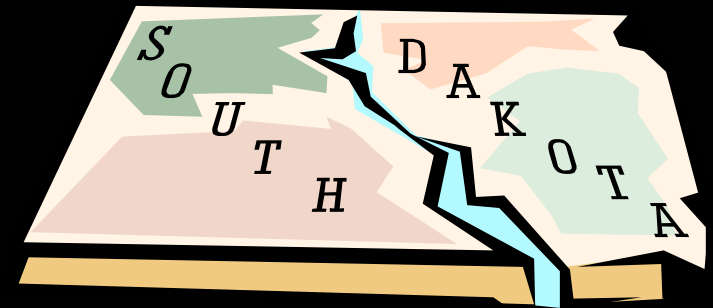
- State MAY direct system to sample source(s)
- 12 monthly samples for fecal indicator
- PN for + samples
- Correction



South Dakota

- 303 sources* < 100'
- 113 of these go thru plants that "probably" have 4 log inactivation
- 190 sources may need "assessment monitoring"


*Wells, galleries, springs, etc

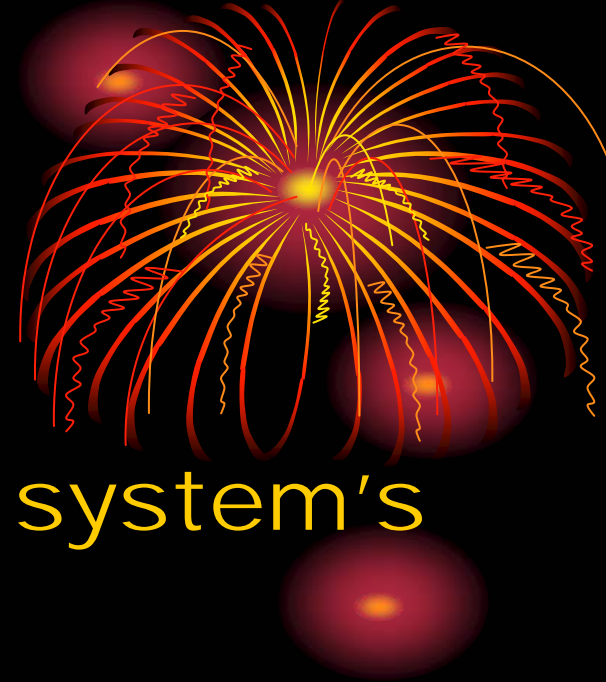


Triggered Monitoring

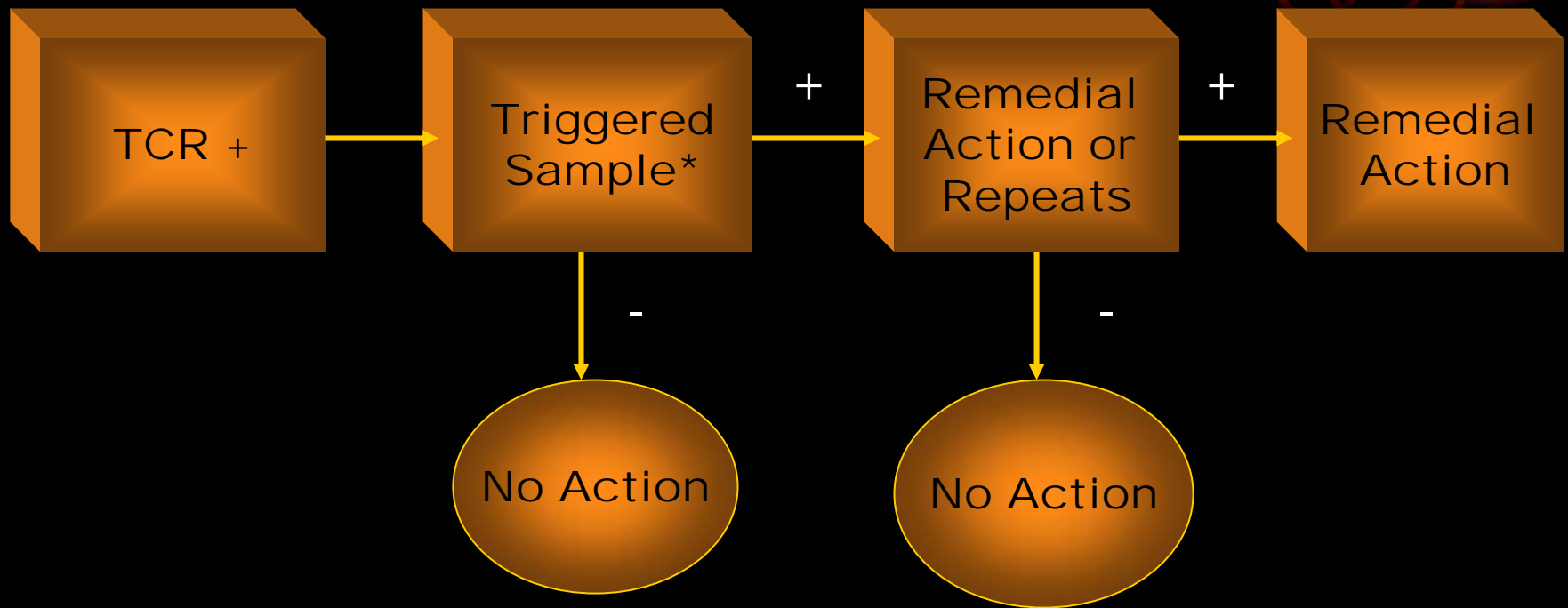


- TCR sample that is TC+
- At least one sample from each GW source in use at time of TC+
- If you have many wells, you may want to submit sampling plan for representative wells
- Analyzed for fecal indicator

- 
- If original TC+ sample was from a consecutive system, “mother” system must collect the source samples
 - If any “triggered” sample is positive
 - Either corrective action OR
 - Five additional GW “repeat” samples
 - If any “repeat” samples positive-
Corrective action



- PN for + samples
- In addition, if “mother” system's source sample is FC+
 - All consecutive systems served must be notified



*If TCR + sample is at a "daughter" system, the triggered sample(s) must be taken by "mother" system.

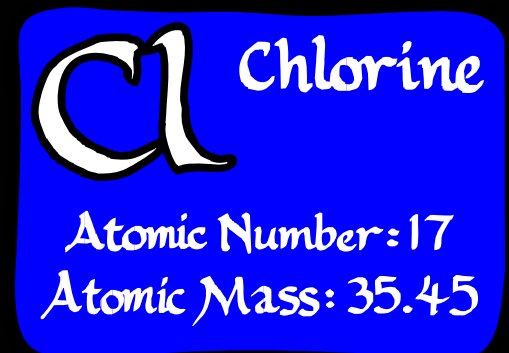
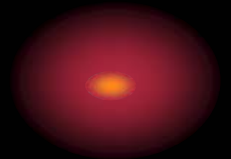
Corrective Actions

- If system has significant deficiency from survey or fecal indicator +, it must-
 - Consult w/ state w/in 30 days
 - Correct problem or have plan/ schedule w/in 120 days

Options for Corrective Action



- Correct all deficiencies
- Alternate water source
- Eliminate source of contamination
- Treatment-4 log virus removal/
inactivation/combo



What is “log” removal?

- If you remove 90% of something that is 1 log removal
- If you remove 90% of what is left, that is another log of removal-Total 2 log (Note-90% + 9% = 99% removal)
- Another 90%-Total 3 log (90% + 9% + 0.9% = 99.9% removal)



Example-1000 People



	Started w/	Removed	# Left
1 Log	1000	900	100
2 Log	100	90	10
3 Log	10	9	1

So starting w/ 1000 people, a 3 log (or 99.9%) removal leaves you w/ 1 person left.

...so to meet the GWR, you
will need enough
disinfectant and/or time to
remove 99.99% of viruses
(Inactivation)

This would be a 4 log
reduction OR



- Membrane filtration (Removal)
- Combination of removal & inactivation
- Other State approved method

Very Important Point! (VIP)



Just because you are chlorinating, this does not mean you are already in compliance with the GWR. You must have enough CT to meet the 4-log removal.

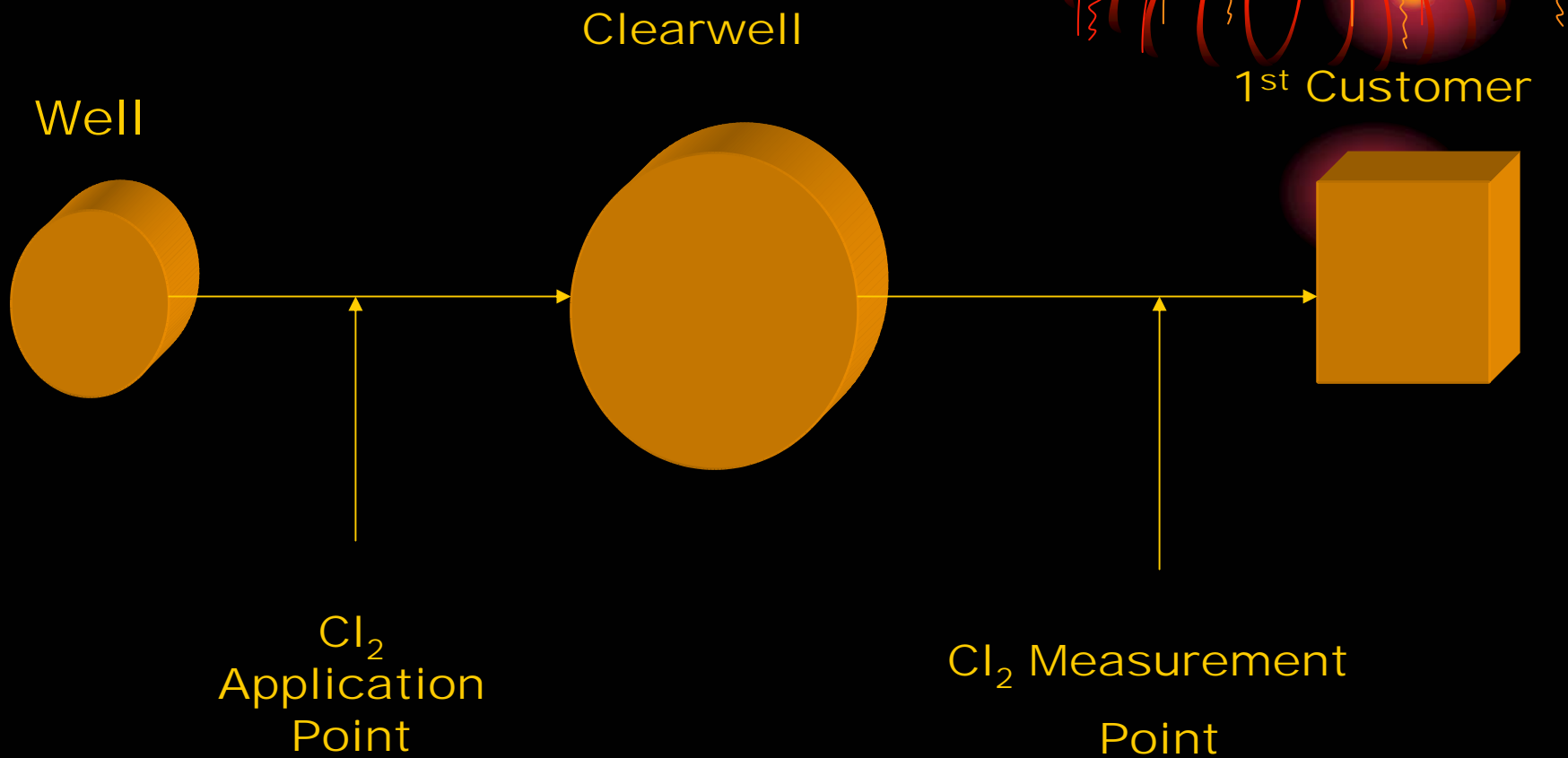


CT Values 4 Log Virus Removal



Temp	Free Cl ₂ - pH 6-9	Free Cl ₂ - pH 10	ClO ₂ - pH 6-9	Chloramines
0.5	12	90	50.1	2883
5	8	60	33.4	1988
10	6	45	25.1	1491
15	4	30	16.7	994
20	3	22	12.5	746
25	2	15	8.4	497

Water System



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Baffling Factors*



Unbaffled	0.1	None
Poor	0.3	Single or multiple unbaffled in/outlets...
Average	0.5	Baffled inlet or outlet, some intra-basin...
Superior	0.7	Serpentine or perforated intra-basin baffles...
Perfect	1.0	Similar to pipe flow

CT Calculation

- Using Free Cl_2
- Temp 10°C and pH 7.5
- DT from pt of application to pt where Cl_2 is measured is 3 minutes at highest flow
- From previous table, required CT = 6
- Free Cl_2 level must be at least 2 mg/l

$$6 \text{ CT} / 3 \text{ minutes} = 2 \text{ mg/l}$$

- If DT was only 1 minute then Cl_2 would have to be 6 mg/l





Time versus Chlorine
Level

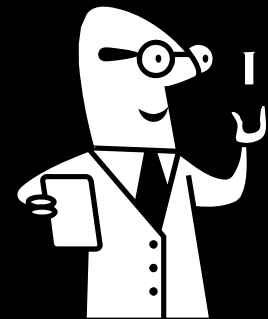


If anyone wants to show
they have a 4 log
inactivation, there is a
spreadsheet available;
however, ...

Compliance Monitoring



- 3300 or more people-
Continuously monitor residual
- < 3300 people-Daily grab sample
for residual
- Provisions for other
types of treatment

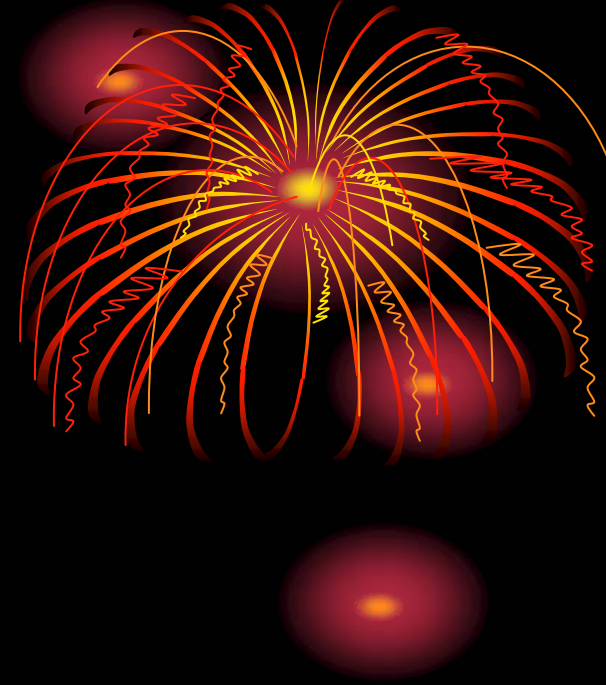


Options



- If you have only a couple wells, it might be OK to take source samples after TCR+.
- If you have a lot of wells, it might be worthwhile to show 4 log and avoid triggered monitoring.

Summary



- December 1, 2009
- Triggered Sampling
- Show 4-log inactivation
- "Significant deficiencies" must be fixed

EPA web site for Groundwater Rule

www.epa.gov/ogwdw/gwr.html



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May I Answer Any Questions?

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